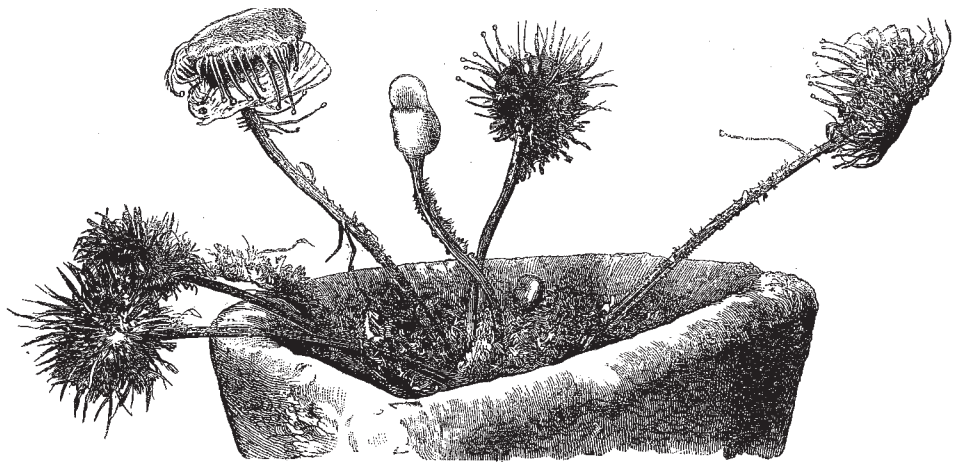
If anything could demonstrate the propensity for fly-catching known to exist in this class of plants, surely this specimen does in the most marked degree. You will see that a moth has been entangled by the hairs of one of the leaves, which leaf has curved



itself right over the moth in the most determined fashion. There is every appearance of a struggle having taken place which ended in the defeat and destruction of the moth.

This specimen is, I should imagine, a very typical one, and as such I have sent a copy to Mr. Darwin. WRIGHT, WILSON

Birmingham

The Radiant Centre of the Perseids

FROM twenty meteors, mostly with streaks, I deduced the radiant point at R.A. 40°, Dec. 56° N., August 3-7. On August 10 I saw a large number (fifty-seven per hour) of *Perseïds*, many of them with short tracks near the focus, and almost invariably with streaks, from 43° + 58°. On August 12 I observed quite an outburst of precisely similar meteors from a sharply-defined centre at 50° + 55°, and registered fourteen of them, but many others were noted between 12h. and 14h. On the 16th, between the same hours, I saw five paths close to a radiant at 60° + 59°. These had streaks and apparently exhibited the same features of motion, colour, &c., as those recorded on the few preceding nights. Can these four positions represent one and the same system of *Perseïds* with an apparent displacement of the radiant centre on the several nights of observation? The places may be regarded as accurate for the dates, and though quite possibly they are separate showers, it is at least singular they became so well marked one on each night. If the positions include the same system then the focus of divergence appears to have shifted from 40° + 58° on the 3rd-7th to 60° + 59° on the 16th, so that while the declination remained nearly the same the R.A. had advanced twenty degrees, which in D. 59° N. is equivalent to ten linear degrees of space.

It is a capital plan while observing and mapping meteor tracks to hold a perfectly straight rod in the hand, and directly a meteor is seen, to project the rod upon its apparent path, carrying the eye back in the same line of motion and noting the exact point with reference to stars upon which it converges. In the case of slow meteors or meteors with streaks, this is a very accurate method and especially to be recommended in regard to paths presumably a long way from the radiant. Eye-estimates are necessarily less exact, for while the *position* of the track is being noted the more important feature of *direction* is inaccurately remembered. W. F. DENNING

August 17

Fish Commensals of Medusæ

IN the numbers of NATURE for July 19 and 26 (pp. 227, 248) are communications respecting fish-sheltering Medusæ. The *Trochurus* in Europe appears to be a commensal of the Acaleph as well as the *Pollochius*. In the eastern waters of the United States, however, so far as I am aware, the Stromatoid fish *Poronotus similis* (*Stromateus similis* of some authors) seems to be the most common, if not the only associate, of several acalephs, viz., *Dactylometra quinquecirra, Zygodactylon grœnlandica*, and *Cyarea arctica*. Under the umbrellas of these species small *Poronoti* are to be found in the late summer swimming, sometimes even to the number of twenty or more, but generally much fewer. Mr. Alexander Agassiz, in his "Sea-side Studies," mentions the occurrence of an undetermined "Clupeoid" fish, but no other, under the umbrella of *Dactylometra quinquecirra;* the identification is probably erroneous. At least my own observations were made in the same region and at the same time of the year as Mr. Agassiz's, and only the *Poronotus* was seen. More detailed information respecting this association may be found recorded by Prof. Verrill in the "United States Commission of Fish and Fisheries" reports, Part I., pp. 449-450, 1873.

THEO. GILL

Smithsonian Institution, Washington, August 6

Science in Spain

I THINK it may interest the readers of your journal to have some slight idea of the state of natural sciences in Spain. Science is universal, and the efforts made by a nation which has been separated by centuries of intolerance and indifference from the movement and scientific life of other countries, cannot fail to be looked upon with indulgent eyes by those who cultivate science.

Of the three great branches into which we may divide natural science—physics, chemistry, and natural history, the first is in a most backward state in Spain. In almost all the professorships where this science is taught, the instruction given is so out of date, that no mention is made of the modern theory of the correlation of forces or thermo-dynamics, and the text-books used are French works, now quite obsolete. In every one of our upper schools—Institutos de 2da Ensiñanza—there is a professor who teaches physics and chemistry conjointly, who is instructed to go through a course of these sciences, which are reduced by this means to their lowest possible expression. In our universities, there exist classes in which an amplification of physics is taught; this study is part of those required for the preparatory exercises for the faculty of medicine. This course, if we take into consideration the knowledge brought by the pupils who attend it, is more an explanation of what they ought to have learnt than anything else. At the Madrid University alone, there is a class of "imponderable fluids;" the name in itself suggests an idea quite out of date at the present day. At the same university there is also a class of mathematical physics, but it does not form part of the studies required to receive a doctor's degree in the physico-chemical sciences, and is only included in the mathematical sciences. This is unfortunately all the official instruction on the subject which is given in Spain. Almost all the professors follow the theories which were generally admitted before the discoveries of Grove, Mayer, Rankine, Clausius, Tyndall, and Helmholtz.

During the Republican Government in Spain, it was decreed to reorganise these studies in a manner more in accordance with modern ideas, but the short rule of this reforming government prevented this plan from being carried out, or conquering the

tenacious resistance of the great majority of the Spanish professors.

Some champions of modern ideas are happily not wanting in Spain. Among them is one of the most distinguished members of the Madrid Observatory, Sr. Jimenez, who has written an interesting volume on the theory of numbers, which obtained a prize from the Spanish Academy of Science. Sr. Jimenez began to publish a few years ago a theory of light in compliance with the most authorised physico-mathematical doctrines. A man of immense and varied intellect, as a dramatic poet, as an engineer, as a mathematician and economist, and one of the principal men of the revolution, Sr. Echegaray has done much to popularise the modern theories of physics, by a volume dedicated to the General Public, and also by his elementary treatise on thermo-dynamics. He is now publishing some studies on light in a scientific review, which are chiefly intended to extend these studies in our scientific circles. Dr. Vicuña, Professor of Mathematical Physics at the Madrid University, endeavours to do the same by his teaching, and by means of the articles and memoirs which he publishes from time to time. Of these may be mentioned his theory and calculation of steam-engines in accordance with thermo-dynamics.

The scientific instruction which is given to the young men who attended the upper school at the Observatory of Marino, at San Fernando, near Cadiz, is much commended. Every day foreign books are more universally read, translated, and understood, the most popular being those by Tyndall. Prof. Barreda, Felin, Ramos, v. Chamorro are great advocates of modern science. Sr. Escrig y Mieg, the professor at the Institute at Guadalajara, has set up some interesting scientific apparatus there, and has introduced in the pneumatic machine an improvement which reduces the injurious space. The barometer constructed by Sr. Torres, the inventor of probably the most accurate barometer known in European meteorology, merits special mention. It is much to be regretted that owing to special circumstances, his instrument could not figure at the interesting exhibition at South Kensington.

At the Free Institution, lately established for teaching at Madrid, by private enterprise, which the readers of NATURE have already seen referred to in your columns, there is a class of experimental physics, according to the latest development of this science. On the evening of January 28, a series of public lectures were begun, with the object of popularising science in Spain. Dr. Simarro, a young professor at this institution, gave the first lecture on light, and repeated some of Tyndall's most remarkable experiments.

Most of these efforts are, however, still limited to the attempt to spread in Spain a knowledge of the actual state of physical science from other countries which are in a more advanced condition, rather than to contribute to general culture works of original investigation. The interesting studies of Prof. Serrano Faligate, on general and biological physics, some of which have been noticed by English reviewers, are almost the only works on the subject which can be mentioned of importance. It is indeed to be hoped this will no longer be the case when these studies are more generally developed, and act as a stimulant to the genius of the Spanish people.

Madrid FRANCISCO GINEZ DE LOS RIOS

OUR ASTRONOMICAL COLUMN

THE ROTATION of SATURN.—In NATURE (vol. xv. p. 243), reference was made to the discovery by Prof. Asaph Hall of a small, well-defined, very white spot upon the disc of Saturn just below the ring, and to observations which were in progress to ascertain, by means of it, the period of the rotation of the planet upon its axis. Prof. Hall succeeded in following up this spot which was from 2″ to 3″ in diameter until January 2, when the weather having become unfavourable, the planet low, and the spot faint and indistinct, observations were discontinued. From a thorough discussion of the observations at Washington and elsewhere in the United States, Prof. Hall finds for the mean time of the rotation of Saturn—

10h. 14m. 23s·8 ± 2s·30.

It has been necessary to assume that the spot had no proper motion upon the surface of the planet, which is a point on which the observations throw no light.

On the first detection of this spot on December 7, with the view to secure assistance from other observers in noting its central passages on the disc, an ephemeris was circulated from Washington, in preparing which the time of rotation was taken at 10h. 29m. 16·8s., given, as Prof. Hall remarks, "in nearly all the modern text-books as Sir W. Herschel's last and most accurate determination;" notwithstanding this it appears certain that Sir W. Herschel never assigned this period, and its adoption in the Washington ephemeris was so far unfortunate as it may have rather hindered than assisted observations; indeed "through this mistake several observers failed to see the spot."

It is very probable that Prof. Hall has suggested the real cause of the introduction of this erroneous value for the time of Saturn's rotation into so many of the so-called "text-books," the compilers of which rarely concern themselves with references to original authorities, and yet in this case the erroneous value has been given by writers, whom it might well be supposed it was safe to follow. In the *Exposition du Système du Monde*, the first edition of which appeared in An. IV. of the French republican era, Laplace says that Saturn rotates in 0·428, and the ring in 0·437, these figures being decimals of a day; they correspond to 10h. 16m. 19·2s. and 10h. 29m. 16·8s., the former expresses therefore the Herschelian period of rotation (10h. 16m. 0·4s.) to the nearest decimal in the third place, and the latter is the value for rotation of Saturn given in so many astronomical works. Hence Prof. Hall thinks that some one early in the century copied and converted the wrong number from Laplace and "the book-makers have faithfully copied this mistake."

Hansen in his "Allgemeine Uebersicht des Sonnensystems" gives 10h. 29m. 17s. for time of rotation both of Saturn and his ring; Mädler, "Ueber die Weltstellung der Körper unsers Sonnensystems," has 10h. 16m. for the globe and 10h. 29m. 17s. for the ring, but in the early editions of his treatise on Astronomy (as in that of 1849, pp. 251 and 254) he assigns 10h. 29m. 17s. for the globe, and 10h. 32m., after Herschel, for the ring, adding "wahrscheinlich ist sie der des Saturn selbst gleich und beide sind etwa 10h. 30m. in runder Zahl." Sir John Herschel, in the first edition of his Treatise on astronomy in Lardner's "Cabinet Cyclopædia" published in 1833, gives 10h. 29m. 17s. both for Saturn and the ring, and he probably followed Baily's "Astronomical Tables and Formulæ" which appeared in 1827, and where we find at pp. 39 and 59 the same period 10h. 29m. 16·8s. assigned for both rotations, and Baily expressly states that "the elements of the system are taken for the most part from the *Système du Monde* of M. Laplace (fifth edition, 1824), so that it is possibly to this work, which was one of general reference for many years, that the original oversight suggested by Prof. Hall is to be traced. Sir W. Herschel in the *Philosophical Transactions*, 1790, p. 480, states that his observations of lucid spots upon the ring, supposing them to adhere to it, would be explained by "admitting a revolution of the ring itself in 10h. 32m. 15·4s., and in the volume for 1794, p. 28, he finds for the rotation of the globe of Saturn, 10h. 16m. 0·44s., which are the only values that bear his authority.

Prof. Asaph Hall's value must now be taken as undoubtedly a very close approximation to the true period in which Saturn rotates. According to it, the planet's year consists of 25.217 Saturnian days. To the rarity of spots upon the disc of so small and well-defined a character as that which has been recently observed to such useful purpose at Washington, is perhaps to be mainly attributed the want of an earlier reliable determination of the rotation period in confirmation of Sir W. Herschel's, made upwards of eighty years previously.

THE COMET OF 1812.—In anticipation of the return of this comet to perihelion within the next few years, Prof. Winnecke has published ephemerides to facilitate its